

instruments, and when, towards the end of last century, it was found that, at distances far away from the region affected by the sensible shock, disturbances which were clearly connected with great earthquakes could be detected by suitable instruments, it was natural to suppose that the origin was the same for both. Only of recent years has it been recognised that the earthquake proper, caused directly by fracturing of the surface rocks, is but a secondary effect of a more deep-seated disturbance, or bathyseism, which, and not the earthquake proper, is presumably the origin of the disturbance represented in the preliminary tremors of the distant record.

Meanwhile, seismology has developed on two distinct lines, and in reality into two distinct sciences, differing in method, means, and requirements. On one hand, we have the newer seismology of the long-distance record, in which personal observation counts for nothing; some mechanical ingenuity is required for the design of efficient instruments, some care in the maintenance of them and their records, but after that, the discussion and interpretation are purely a matter of the higher mathematics. On the other hand, we have the older seismology, in which there is still much work to be done, even with no further mathematical equipment than an intelligent schoolboy may carry away from a modern public school, but in which the collection of data is entirely dependent on personal observation, and the coincidence of occasion and a competent observer.

With such a difference of scope and methods, it is scarcely possible for one individual to become a master of both branches, and this is illustrated by the existence of two recent text-books, both nominally of seismology; first we have the "Modern Seismology" of the late Dr. G. W. Walker, which appeared some years ago and is an admirable introduction to the newer development of the subject, but scarcely refers, and only incidentally, to the earthquake proper; then we have this book, by Dr. C. Davison, which is called a manual of seismology and devotes only a part of one chapter to the subject of Dr. Walker's book. The difference accounts for, and is indicated by, the fact that one appeared as a Monograph on Physics, the other as part of the Cambridge Geological Series.

The object, as well as the scope, of Dr. Davison's work accounts sufficiently for the fact that he devotes only part of a chapter to the newer seismology, and the treatment is adequate, in so far as it gives that amount of information which a student of the older seismology cannot afford to ignore. As a manual of that older seismology the book fills a much-felt want, for we had no satisfactory introduction to the study of the earthquake proper. Well arranged and clearly expressed,

the only adverse criticism which can be made is that the ground is possibly too fully covered, and that some matters which might have been omitted from an introductory text-book have necessarily received too brief a treatment; but this fault—if such it be—is counteracted by the references to other works in which the subject is more fully dealt with. These references to previous literature add very greatly to the value of the work; not large in number, they are very judiciously selected, form a satisfactory basis for advanced study in all branches of the subject, and, without exception, are such that no one wishing for a mastery of the subject could afford to leave them unstudied.

R. D. O.

### Chemical and Physical Constants.

*Handbook of Chemistry and Physics. A Ready-Reference Pocket Book of Chemical and Physical Data.* By Prof. C. D. Hodgman, assisted by Prof. M. F. Coolbaugh and Cornelius E. Senseman. Eighth edition. Pp. 711. (Cleveland, Ohio: Chemical Rubber Company, 1920.) 3 dollars.

THIS compact little volume contains a vast array of chemical and physical constants. Since the first publication in 1914 it has passed through eight editions in the United States—a sufficient proof of its utility as "a comparatively comprehensive reference book for use in the laboratory or classroom."

The tables on the properties of inorganic and organic compounds are very complete, and chemists will appreciate particularly the tabular information on the solubility of inorganic salts in water. The data on the "Dehydration of Metallic Sulphates" and the "Decomposition of Anhydrous Metallic Sulphates" are distinctly novel features. In the qualitative analysis scheme it is somewhat difficult to follow out the behaviour of chromium. A very complete table is given of heats of formation and solution, but it is to be regretted that no indication is given as to the sources from which the data have been compiled.

The section devoted to physics is fairly complete, and one notes with pleasure that the table for the reduction of psychrometric observations refers to the ventilated type of wet and dry bulb thermometer only. At the end of the volume eight pages are devoted to problems, the utility of which in a book of data is doubtful.

The book has some blemishes, for the most trustworthy data have not always been chosen. To take one example only, in the table of "Fixed Points for High Temperatures" the melting point of nickel is given as 1427° and that of platinum as 1775°. Ten years ago the Carnegie Institution published a memoir on High Temperature Gas Thermometry, and the values

there given (1452° and 1755°) have since been almost universally accepted. Also, in view of the thorough work of Prof. Callendar on the specific heat of water, it is somewhat surprising to find that the values given are "the mean of various determinations, including Calendar and Blonsfield, 1912"; one frequently observes that the names of observers are misspelt as in this quotation.

It is hoped that before the next edition is issued the various sections will be submitted to expert scrutiny, for the value of the book would be greatly enhanced if the user could feel sure that the most trustworthy data are quoted. E. GRIFFITHS.

### Our Bookshelf.

*Illustrations of the Flowering Plants and Ferns of the Falkland Islands.* By Mrs. E. F. Vallentin. With descriptions by Mrs. E. M. Cotton. Pp. xii+64 plates+text+ii. (London: L. Reeve and Co., Ltd., 1921.) 84s. net.

SINCE the publication of Sir J. D. Hooker's "Flora Antarctica" much progress has been made in the study of the Falkland flora and from a taxonomic standpoint it may now be said to be well known. Nevertheless, a well-illustrated compact flora has been a desideratum and it is thus additionally unfortunate that owing to a serious breakdown in health the completion of Mrs. Vallentin's work has been indefinitely postponed. The volume now under notice contains 64 plates illustrating in colour, and with excellent dissections, many of the most characteristic Falkland plants. Each plate is accompanied by a short description of the family, genus and species. It seems a pity that with the space available fuller descriptions and more detailed ecological notes have not been provided. The repetition of the description of the family appears to be unnecessary; thus the same diagnosis of the Compositæ is repeated eleven times.

The work as a whole illustrates many of the essential features of the Falkland Islands flora. The predominance of dwarf herbaceous and subshrubby perennials, especially characteristic of steppe and heath formations, is emphasised both by the plants chosen for illustration and by the small number of therophytes and the absence of phanerophytes, except for a few nanophanerophytes.

We have no doubt that this work will prove most useful to inhabitants of the Falkland Islands who take an interest in the natural history of their country by enabling them to identify easily many of the common plants around them, and that it will also be used in a more general manner by workers in systematic and geographical botany in other countries.

W. B. TURRILL.

*The Microscope: Its Design, Construction and Applications. A Symposium and General Discussion by many Authorities.* Edited by F. S. Spiers. Pp. v+260+plates. (London: Charles Griffin and Co., Ltd., 1920.) Price 21s. net.

THE addresses and papers given in 1920 at the conjoined meeting of the Faraday, Royal Microscopical,

Optical and Photomicrographic Societies and Technical Optics Committee of the British Science Guild are gathered together conveniently in the volume under notice. All the papers are by specialists in their respective branches and the whole constitutes a valuable contribution to microscopical science. The President, Sir Robert Hadfield, in his introductory address traced the history of the development of the microscope, and papers on the earliest steps in the invention of the microscope and on the history and design of photomicrographic apparatus are contributed by Dr. Singer and Mr. Martin Duncan respectively. The future of the microscope is dealt with in suggestive papers by Mr. Barnard and Mr. Schneider, while Profs. Cheshire, Conrady and Porter discuss the mechanical design and optics of the instrument. Many experts in their particular subjects give practical details on the application of the microscope in fermentation industries, in petrology, metallurgy, engineering and metrology. Methods of illumination, the testing of objectives, and optical glass and its manufacture are other subjects dealt with. In addition to the papers themselves, a summary of the discussions following their reading is included and the volume is illustrated with many plates and figures. The work, which has been ably edited by Mr. Spiers of the Faraday Society, is indispensable to any one desiring to follow the trend of the modern developments of the microscope and of microscopical science. R. T. H.

*Introduction to the Study of Minerals and Guide to the Mineral Collections in Kelvingrove Museum.* By Prof. P. MacNair. Second edition. Pp. viii+94+1 plate. (Glasgow: Hay Nisbet and Co., Ltd., 1921.) 1s.

PROF. MACNAIR is to be congratulated on having introduced many improvements in the second edition of his useful guide-book. The figures illustrating the crystal-forms are much more accurate than those published in the first edition, though there are still a few which should have been replaced. The part dealing with crystallography has been much increased and the systems have been subdivided into groups, the introduction of which in place of the classes of the accepted systems of crystallography is rather confusing.

The guide includes a clear account of the optical and other properties of minerals, a description of some of the commoner species, a glossary of terms, and a list of species in the collection. The book is based very much on the lines of Fletcher's "An Introduction to the Study of Minerals," of which the fifteenth edition is still used as the guide to the Mineral Department of the British Museum (Natural History). It will be noted that Prof. MacNair in Glasgow has produced his book at sixpence less than the price of the British Museum Guide.

*The Secrets of the Self. (Asrār-I Khudī.)* A Philosophical Poem. By Sheikh Muhammad Iqbal. Translated from the Original Persian with Introduction and Notes by Dr. R. A. Nicholson. Pp. xxxi+147. (London: Macmillan and Co., Ltd., 1920.) Price 7s. 6d. net.

THIS poem has an interest beyond that of its artistic form or æsthetic content, for it reveals the effect on the oriental mind of contact with the culture and philo-